FIG. 1

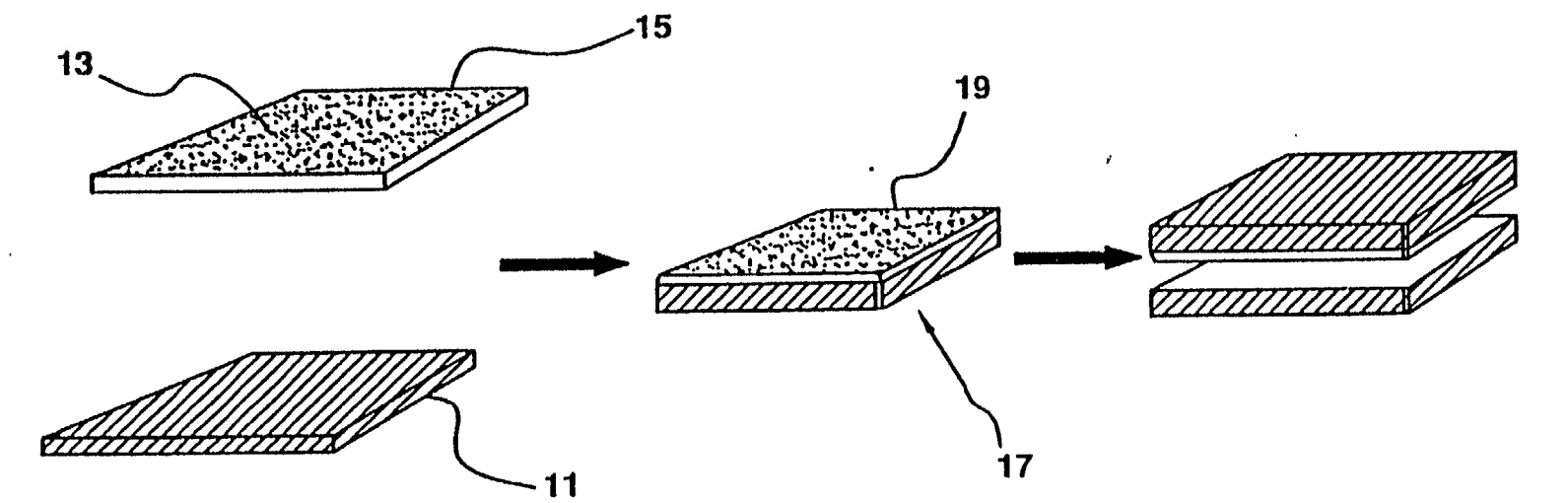


FIG.2A

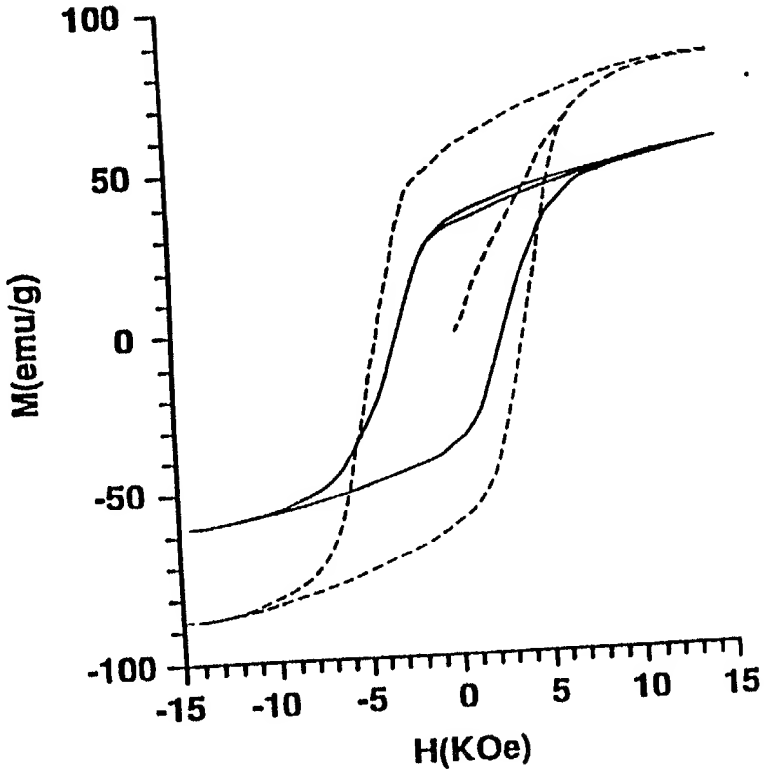

100
50
0
-50
-100
M(emu/g)
-15
-10
-5
0
5
10
15
H(KOe)

FIG. 2B

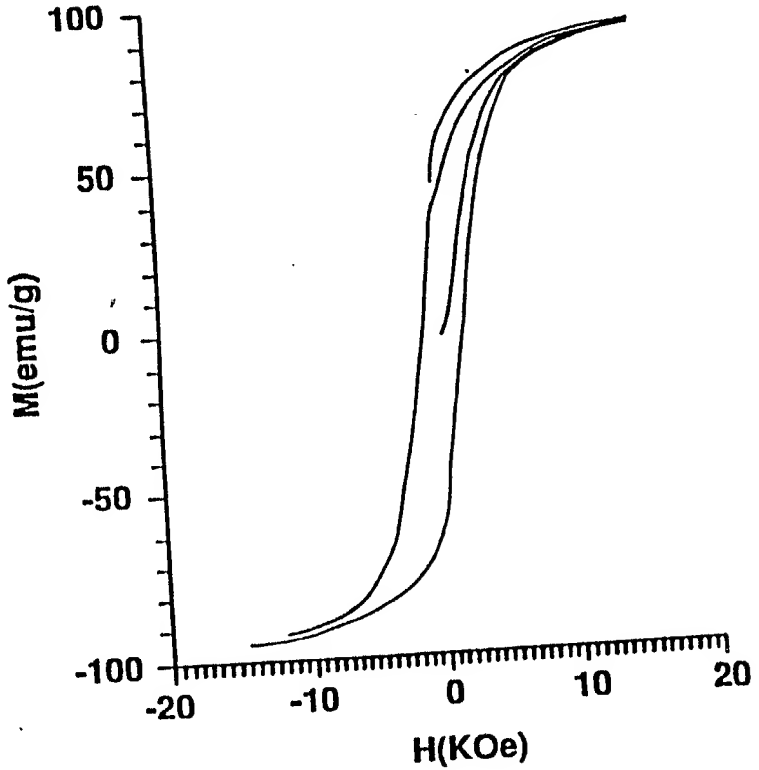

100
50
0
-50
-100
M(emu/g)
-20
-10
0
10
20
H(KOe)

FIG. 3

Smart Susceptor Test Results

Material	Type	Geometry	Curie Temp °C	Heating Results 275 kHz	4MHz
$Co_2Ba_2Fe_{12}O_{22}$	ferromagnetic	powder	345	60 - 65°C	340 - 370°C
Fe_3O_4 (44 micron)	ferromagnetic	powder	585	350°C	600°C
Fe_3O_4 (840 micron)	ferromagnetic	powder	585	470°C	not tested
$SrFe_{12}O_{19}$ #1	ferromagnetic	powder	450	60°C	not tested
$SrFe_{12}O_{19}$ #2	ferromagnetic	powder	450	88°C	not tested

TOTOSO: SSO24850

FIG. 4A

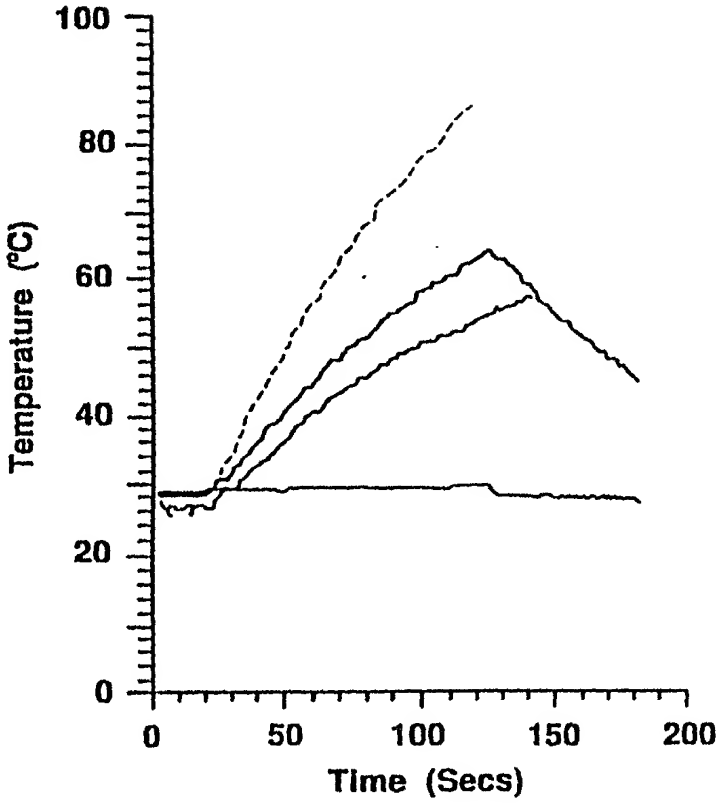


FIG. 4B

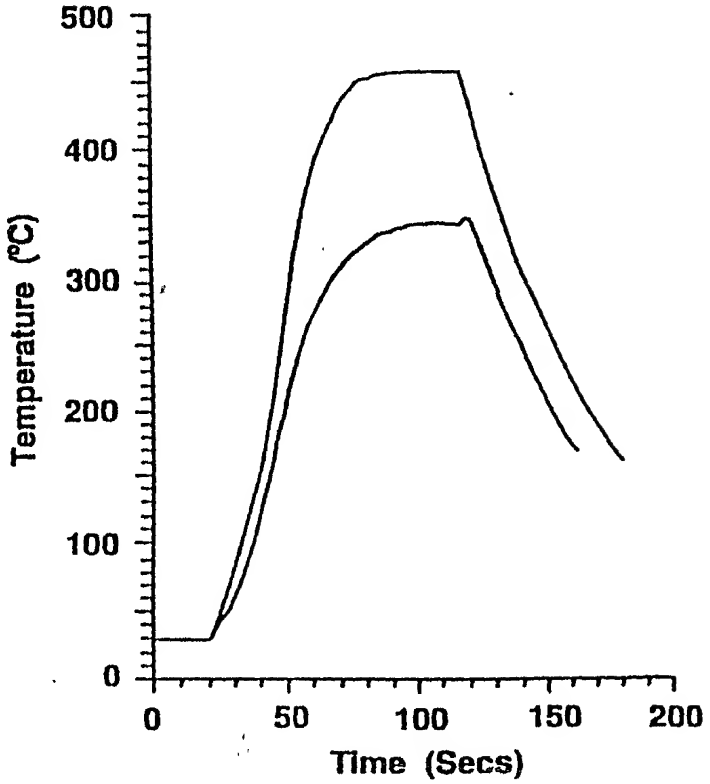


FIG. 5

Smart Susceptor Test Results for Filled Films

Material	Geometry	Thickness (mils)	Curie Temp °C	Heating Results 275 kHz	4 MHz	6.5 MHz
$SrFe_{12}O_{19}$ #1	30 % filled PSF film	4.0	450			149 °C
$SrFe_{12}O_{19}$ #2 (1-2 micron)	30 % filled PSF film	4.0	450			343 °C
$SrFe_{12}O_{19}$ #2 (1-2 micron)	30 % filled PSF film	10.0	450			371 °C
$SrFe_{12}O_{19}$ #2	30 % filled PSF film	8.0	450			360 °C
$Co_2Ba_2Fe_{12}O_{22}$	30 % filled PSF film	4.0	345		109 °C	
$Co_2Ba_2Fe_{12}O_{22}$	30 % filled PSF film	8.0	345			249 °C
$Co_2Ba_2Fe_{12}O_{22}$ (<1 micron)	30 % filled PSF film	4.0	345			243-249 °C
$Co_2Ba_2Fe_{12}O_{22}$ (<1 micron)	30 % filled PSF film	8.0	345			288-302 °C
$Co_2Ba_2Fe_{12}O_{22}$ (<1 micron)	30 % filled PSF film	10.0	345			288-302 °C
Fe_3O_4 (840 micron)	30 % filled PSF film	4.0	585	50 °C		
Fe_3O_4 (44 micron)	10 % filled PSF film	4.0	585	38 °C		>371 °C
Fe_3O_4 (44 micron)	30 % filled PSF film	4.0	585	210 °C		

Susceptor/Polymer Matrix

Susceptor (T curie)		SrF (450C)	Co-2Y (340C)	Mg-2Y (260-280)	Zn/Co-2Y (255C)	Zn/Mg-2Y (175C)	Soft Ferr (120-350)
Polymer	Workng Temp (note 1)				Note 3	Note 3	Note 4
PEEK	360C	X	X				
PEKK		X	X				
PEI	340C	X	X				
PPS	340C	X	X				
PSU	340C	X	X				
PET	280-300		X				X
Polyester	280-300		X				
MXD6	270-280			X			X
PA	220C			X	X	X	X
PP	200-210			X	X	X	X
PP/MXD6	200-210			X	X	X	X
PP/EVOH	200-210			X		X	X
PE	190-200						

Notes:

(1) "Working Temp" of Polymer is approx. 30C above melting temp.

(2) Curie Temps of Zn/Mg and Zn/Co blends vary by concentration of Zn
(3) Curie Temps of soft ferrite vary by choice of ferrite.

FIG. 6

Process Variables

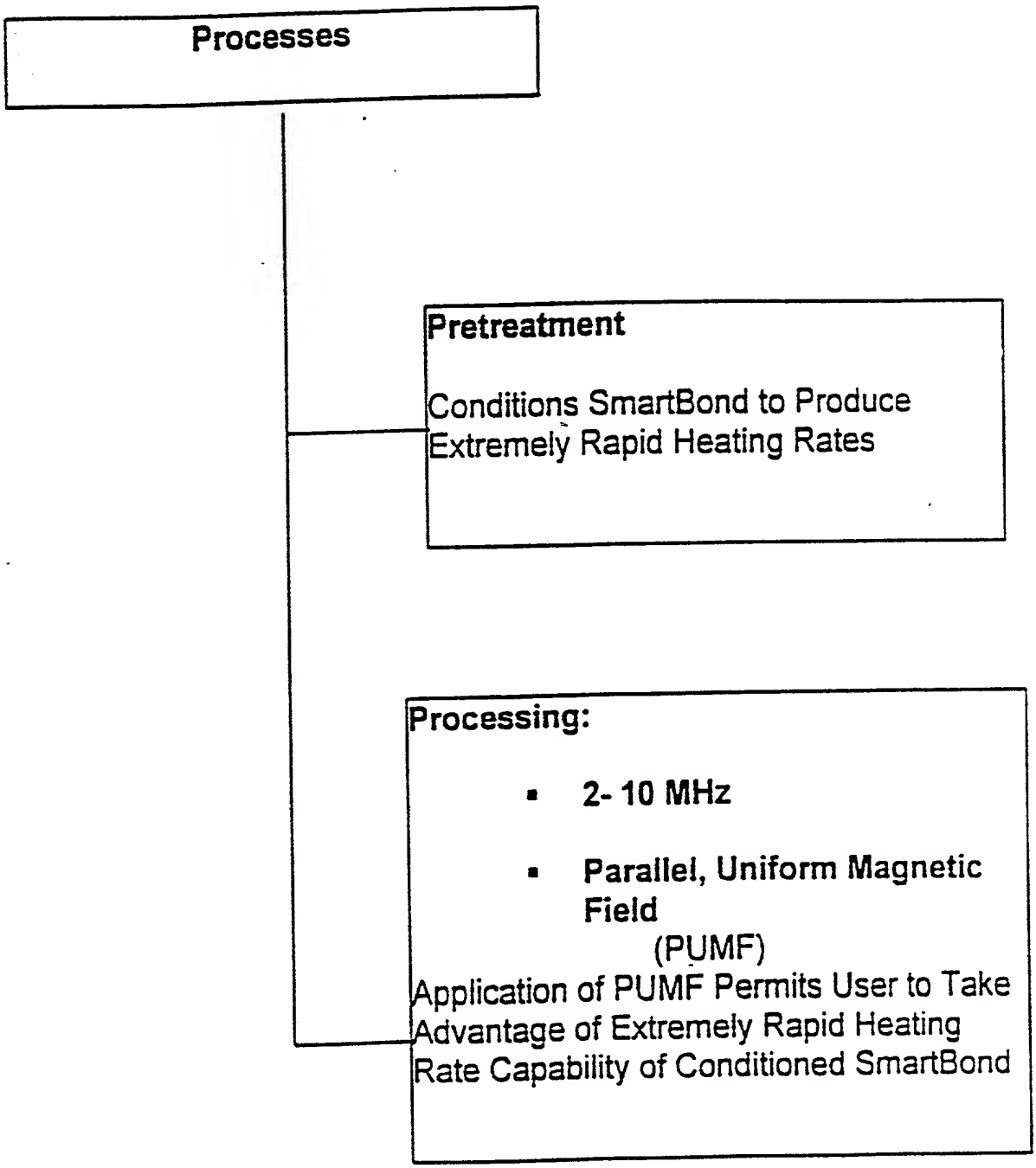


FIG. 7

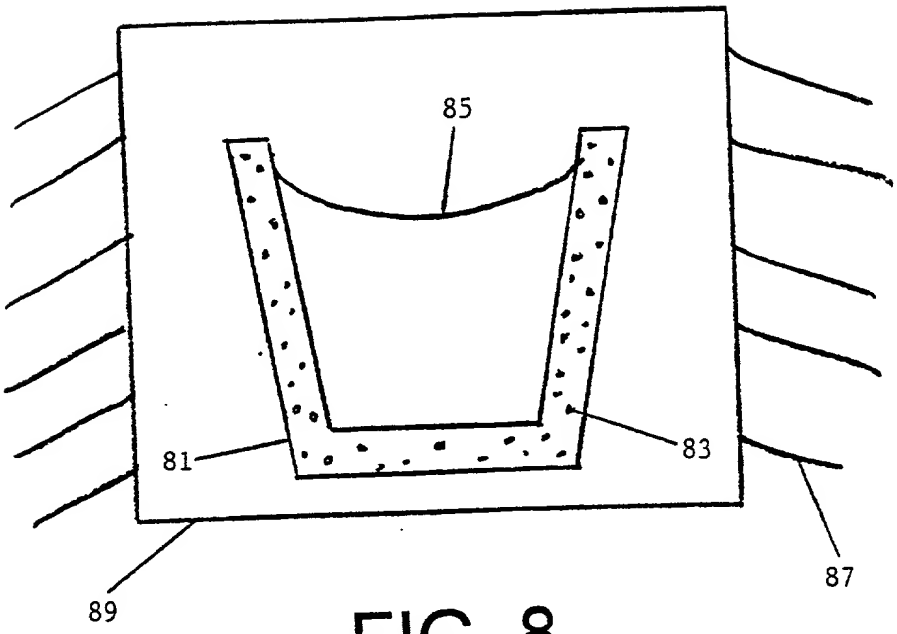


FIG. 8

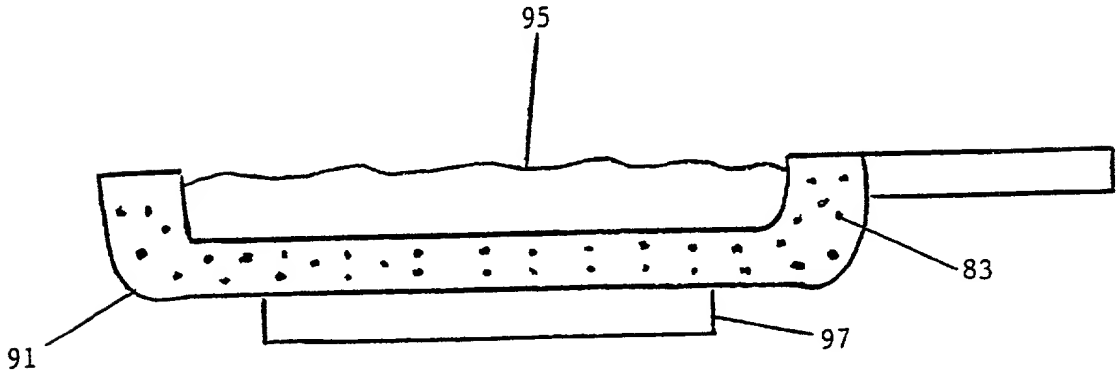


FIG. 9

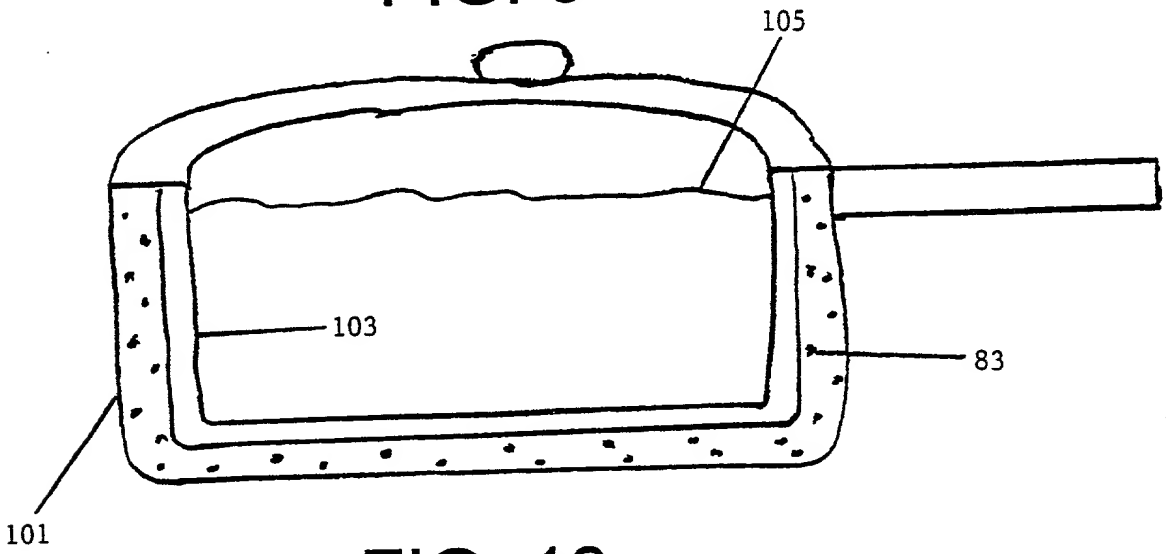
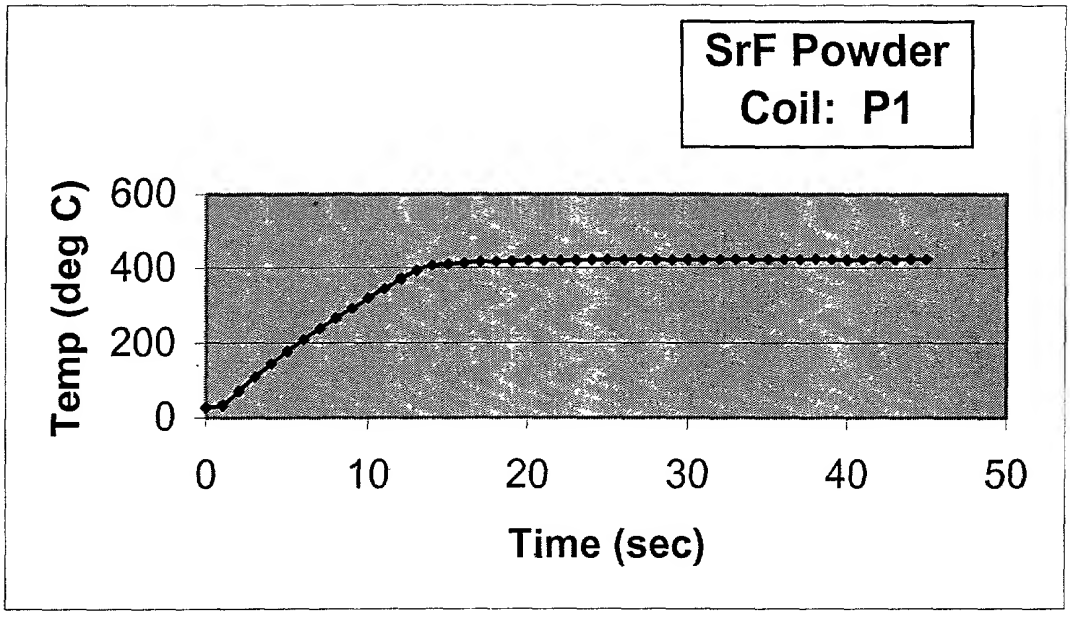
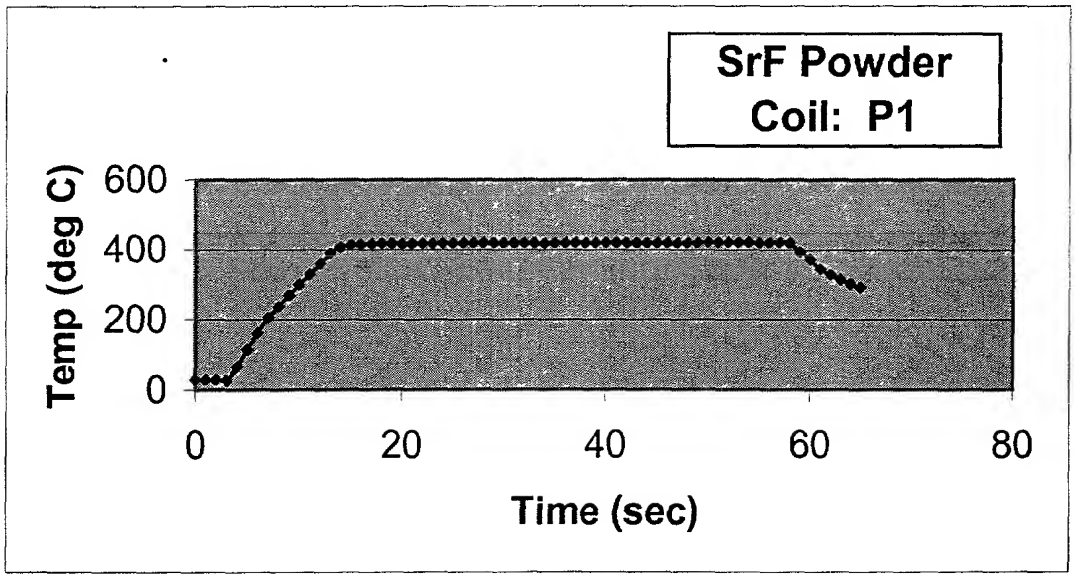


FIG. 10


SrF Powder
Coil: P1
Temp (deg C)
600
400
200
0
0
10
20
30
40
50
Time (sec)

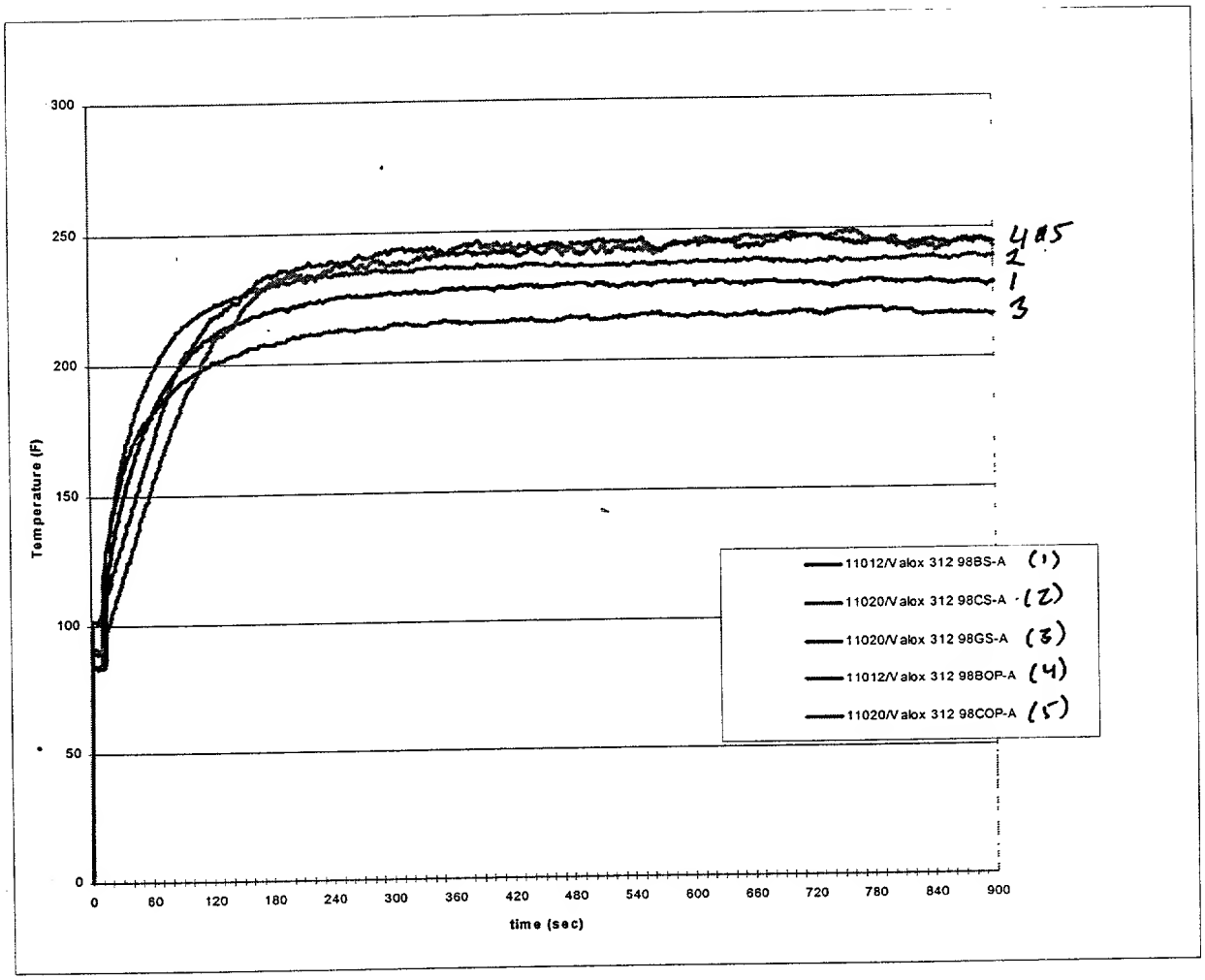
(a)


SrF Powder
Coil: P1
Temp (deg C)
600
400
200
0
0
20
40
60
80
Time (sec)

(b)

Figure 11

Figure 12.


300
250
200
150
100
50
0
Temperature (F)
0
60
120
180
240
300
360
420
480
540
600
660
720
780
840
900
time (sec)
11012/Valox 312 98BS-A (1)
11020/Valox 312 98CS-A (2)
11020/Valox 312 98GS-A (3)
11012/Valox 312 98BOP-A (4)
11020/Valox 312 98COP-A (5)
4 & 5
2
1
3

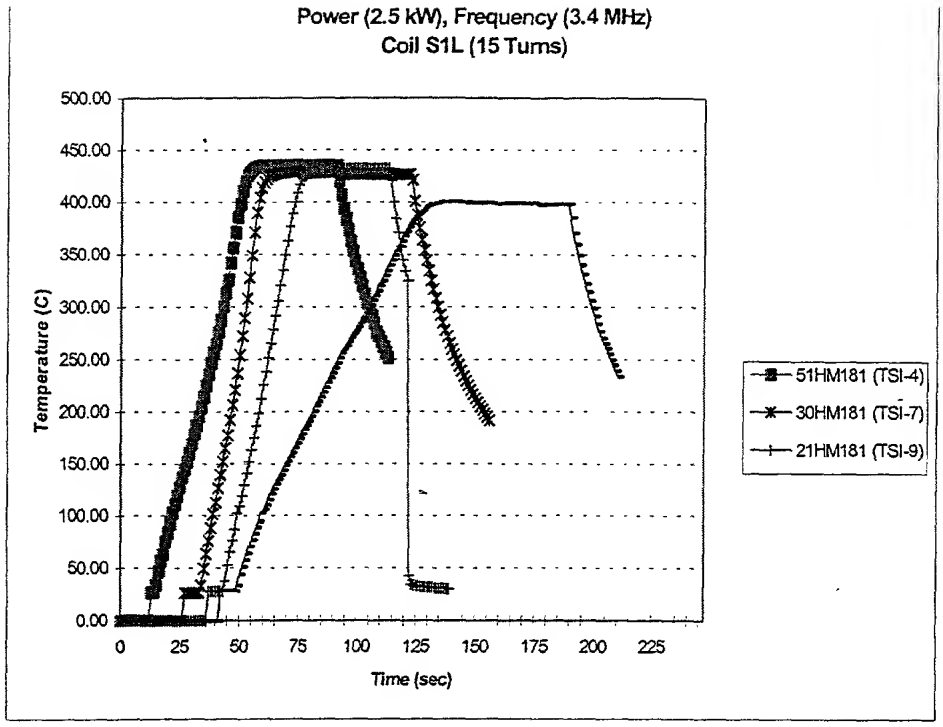

Power (2.5 kW), Frequency (3.4 MHz)
Coil S1L (15 Turns)
Temperature (C)
500.00
450.00
400.00
350.00
300.00
250.00
200.00
150.00
100.00
50.00
0.00
0
25
50
75
100
125
150
175
200
225
Time (sec)
51HM181 (TSI-4)
30HM181 (TSI-7)
21HM181 (TSI-9)

Figure 13

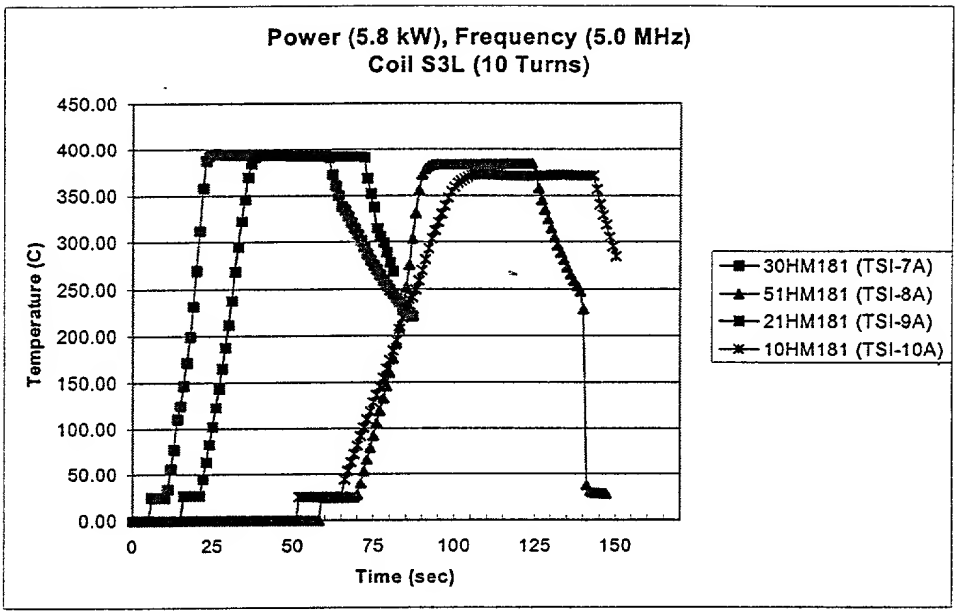
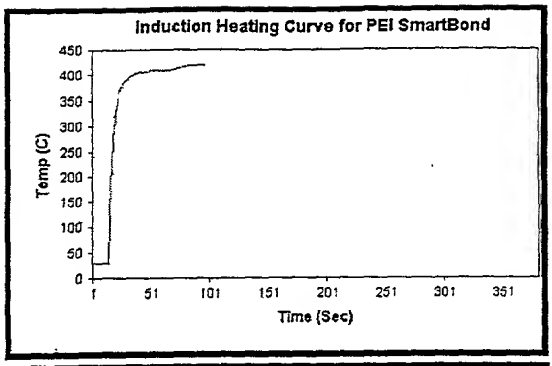
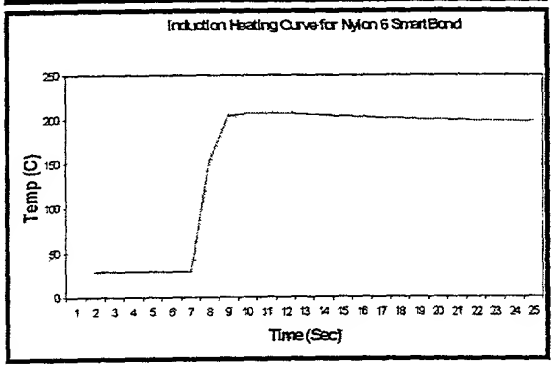

Power (5.8 kW), Frequency (5.0 MHz)
Coil S3L (10 Turns)
Temperature (C)
450.00
400.00
350.00
300.00
250.00
200.00
150.00
100.00
50.00
0.00
0
25
50
75
100
125
150
Time (sec)
30HM181 (TSI-7A)
51HM181 (TSI-8A)
21HM181 (TSI-9A)
10HM181 (TSI-10A)

Figure 14

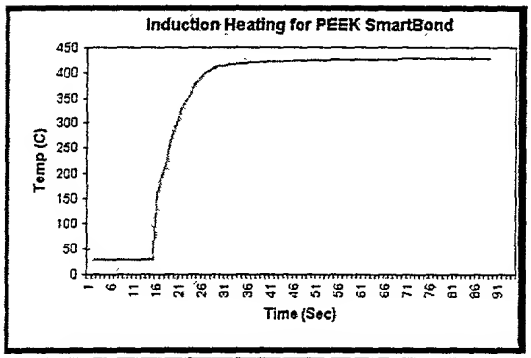
(a)



(b)



(c)



(d)

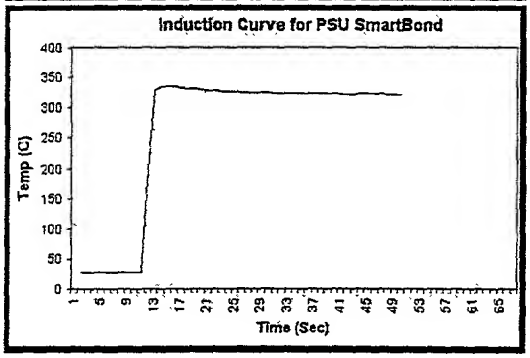


Figure 15

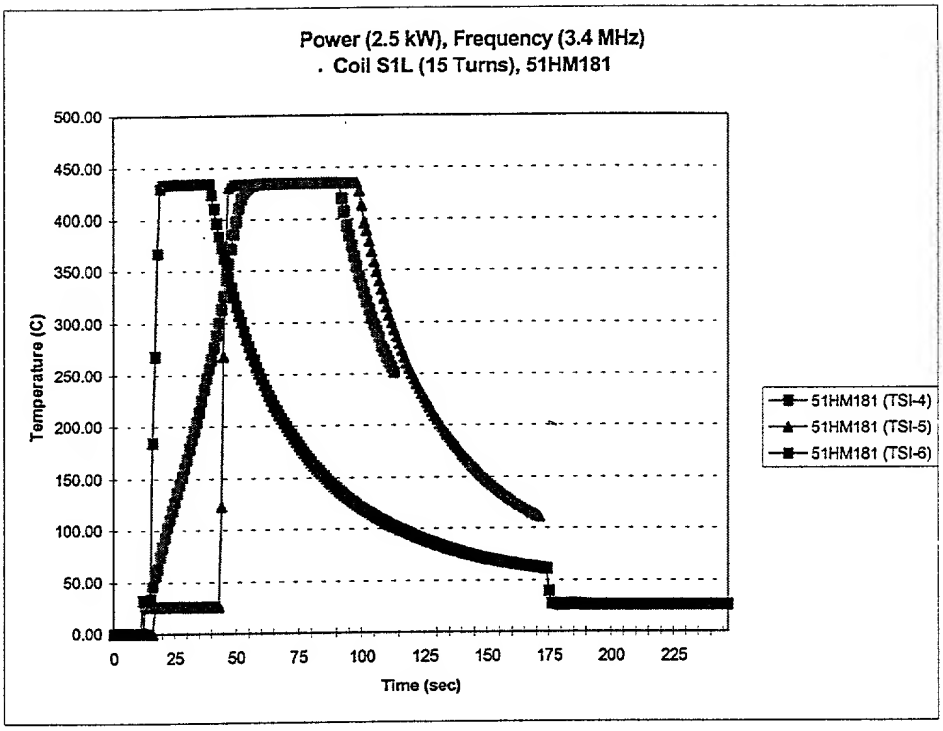

Power (2.5 kW), Frequency (3.4 MHz)
. Coil S1L (15 Turns), 51HM181
Temperature (C)
500.00
450.00
400.00
350.00
300.00
250.00
200.00
150.00
100.00
50.00
0.00
0
25
50
75
100
125
150
175
200
225
Time (sec)
51HM181 (TSI-4)
51HM181 (TSI-5)
51HM181 (TSI-6)

Figure 16

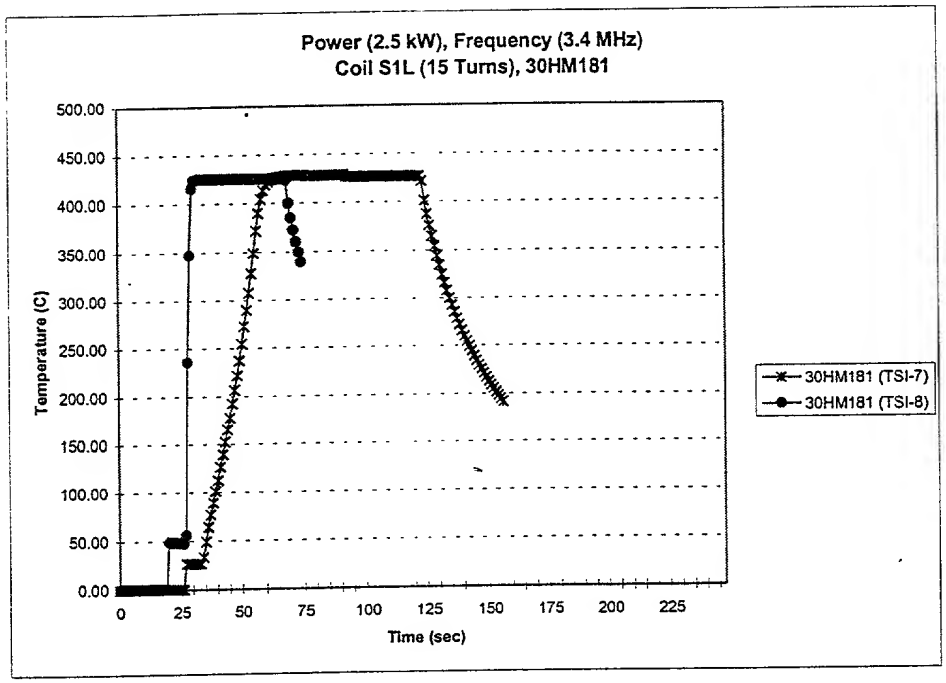

Power (2.5 kW), Frequency (3.4 MHz)
Coil S1L (15 Turns), 30HM181
Temperature (C)
500.00
450.00
400.00
350.00
300.00
250.00
200.00
150.00
100.00
50.00
0.00
0
25
50
75
100
125
150
175
200
225
Time (sec)
30HM181 (TSI-7)
30HM181 (TSI-8)

Figure 17

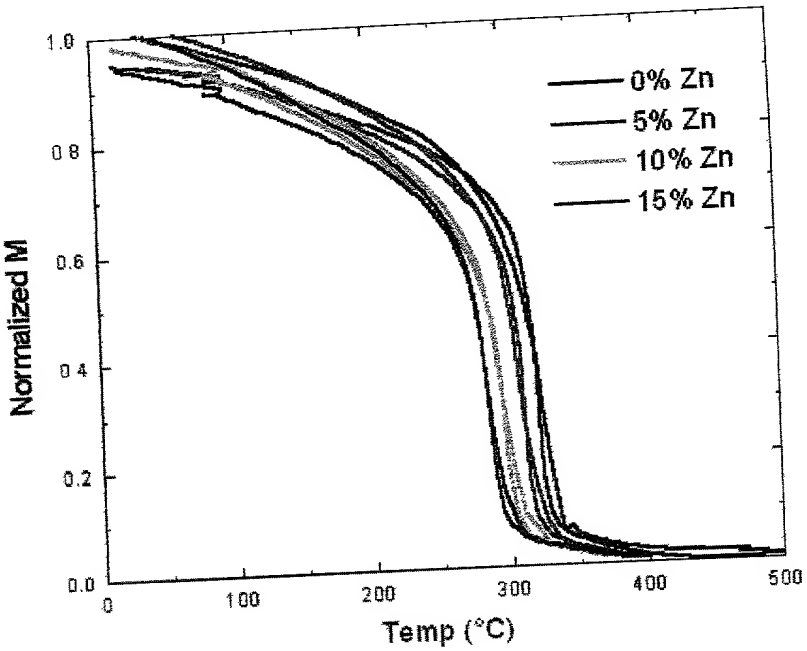

1.0
0.8
0.6
0.4
0.2
0.0
Normalized M
0
100
200
300
400
500
Temp (°C)
0% Zn
5% Zn
10% Zn
15% Zn

FIGURE 18

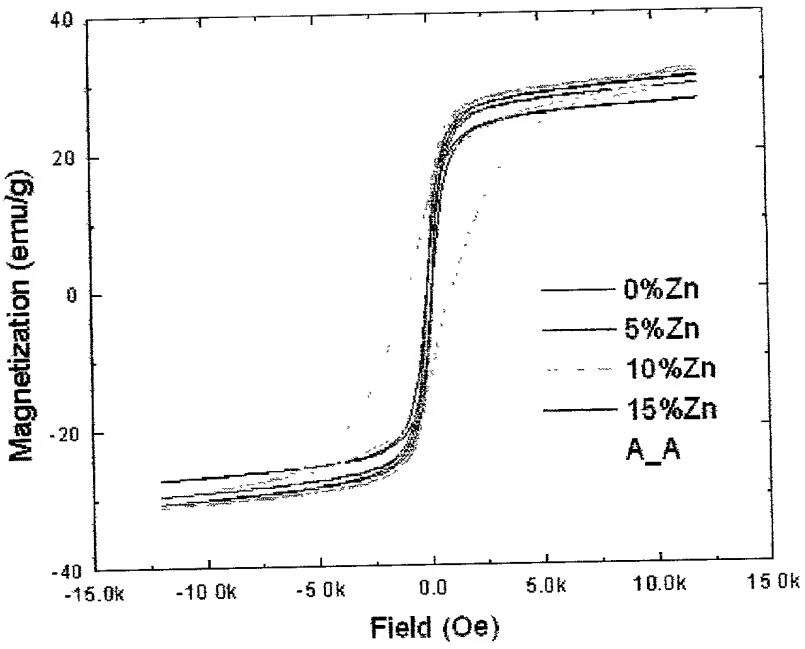
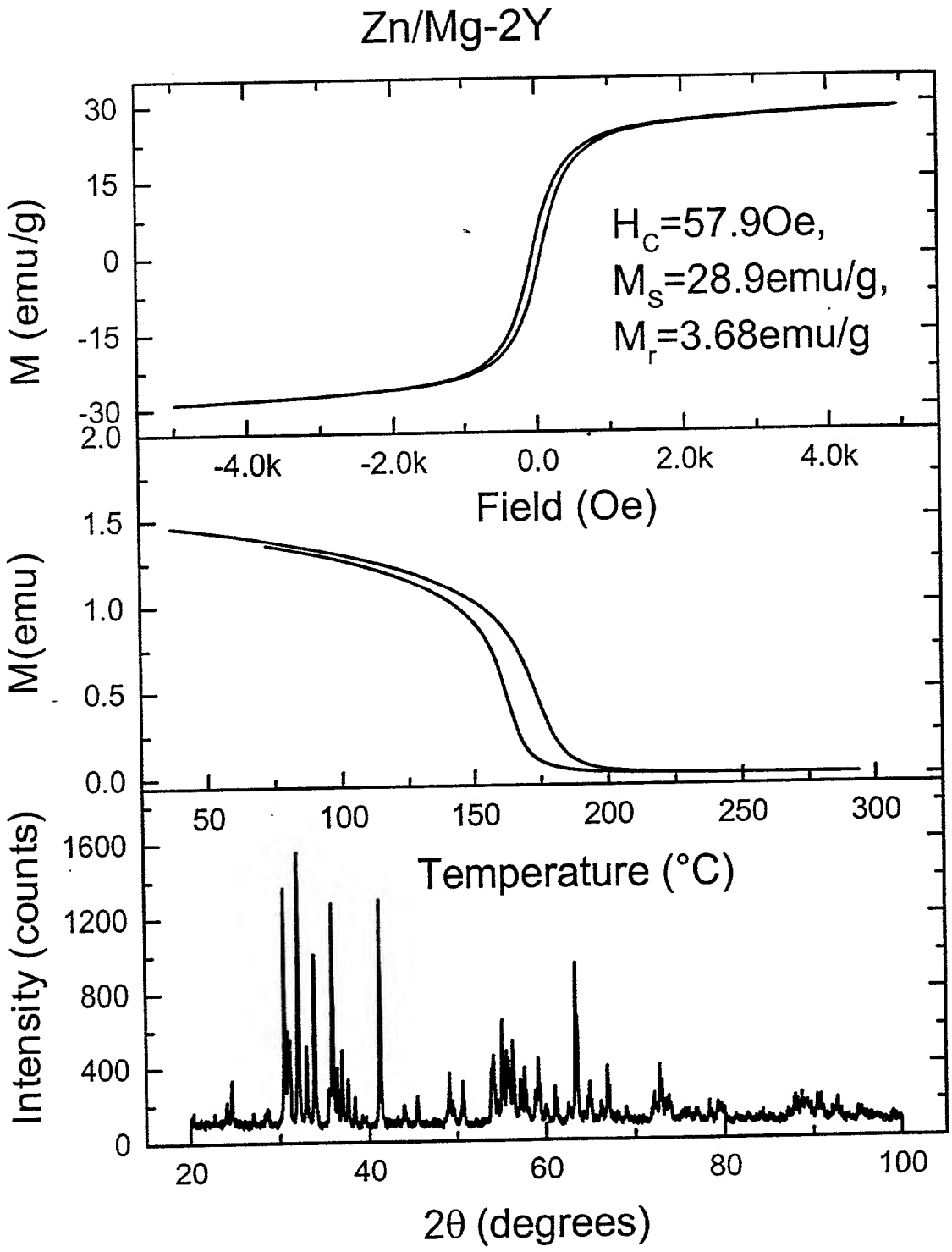

40
20
0
-20
-40
Magnetization (emu/g)
-15.0k
-10.0k
-5.0k
0.0
5.0k
10.0k
15.0k
Field (Oe)
0%Zn
5%Zn
10%Zn
15%Zn
A_A

FIGURE 19

Figure 20


Zn/Mg-2Y
M (emu/g)
30
15
0
-15
-30
H_c=57.9Oe,
M_s=28.9emu/g,
M_r=3.68emu/g
-4.0k
-2.0k
0.0
2.0k
4.0k
Field (Oe)
M(emu)
2.0
1.5
1.0
0.5
0.0
50
100
150
200
250
300
Temperature (°C)
Intensity (counts)
1600
1200
800
400
0
20
40
60
80
100
2θ (degrees)

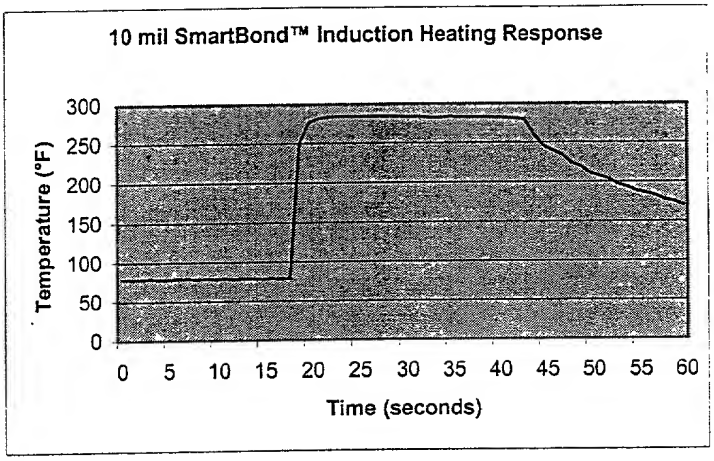

10 mil SmartBond™ Induction Heating Response
Temperature (°F)
300
250
200
150
100
50
0
0 5 10 15 20 25 30 35 40 45 50 55 60
Time (seconds)

Figure 21